to a degree, expecting no magician to lift him over hard work, and later to put him down softly in easy engineering positions. To all such the Throop Polytechnic Institute says, "Come this way!"

HENRY S. CARHART

*MEDICAL EDUCATION IN THE UNITED STATES AND CANADA*[1]

THE necessity of a reconstruction that will at once reduce the number and improve the output of medical schools may now be taken as demonstrated. A considerable sloughing off has already occurred. It would have gone further but for the action of colleges and universities which have by affiliation obstructed nature's own effort at readjustment. Affiliation is now in the air. Medical schools that have either ceased to prosper, or that have become sensitive to the imputation of proprietary status or commercial motive, seek to secure their future or to escape their past by contracting an academic alliance. The present chapter undertakes to work out a schematic reconstruction which may suggest a feasible course for the future. It is not supposed that violent measures will at once be taken to reconstitute the situation on the basis here worked out. A solution so entirely suggested by impersonal considerations may indeed never be reached. But legislators and educators alike may be assisted by a theoretical solution to which, as specific problems arise, they may refer.

This solution deals only with the present and the near future—a generation, at most. In the course of the next thirty years needs will develop of which we here take no account. As we can not foretell them, we shall not endeavor to meet them. Certain it is that they will be most effectively handled if they crop up freely in an unencumbered field. It is therefore highly undesirable that superfluous schools now existing should be perpetuated in order that a subsequent generation may find a means of producing its doctors provided in advance. The cost of prolonging life through this intervening period will be worse than wasted; and an adequate provision at that moment will be embarrassed by inheritance and tradition. Let the new foundations of that distant epoch enjoy the advantage of the Johns Hopkins, starting without handicap at the level of the best knowledge of its day.

The principles upon which reconstruction would proceed have been established in the course of this report: (1) a medical school is properly a university department; it is most favorably located in a large city, where the problem of procuring clinical material, at once abundant and various, practically solves itself. Hence those universities that have been located in cities can most advantageously develop medical schools. (2) Unfortunately, however, our universities have not always been so placed. They began in many instances as colleges or something less. Here a supposed solicitude for youth suggested an out-of-the-way location; elsewhere political bargaining brought about the same result. The state universities of the south and west, most likely to enjoy sufficient incomes, are often unfortunately located: witness the University of Alabama at Tuscaloosa, of Georgia at Athens, of Mississippi at Oxford, of Missouri at Columbia, of Arkansas at Fayetteville, of Kansas at Lawrence, of South Dakota at Vermilion; and that experience has taught us nothing is proved by the recent location of the State University of Oklahoma at Norman. Some of these institutions are freed from the necessity of undertaking to teach medicine by an endowed institution better situ-

[1] From the Report to the Carnegie Foundation for the Advancement of Teaching by Abraham Flexner.

ated; in other sections the only universities fitted by their large support and their assured scientific ideals to maintain schools of medicine are handicapped by inferiority of location. We are not thereby justified in surrendering the university principle. Experience, our own or that of Germany, proves, as we have already pointed out, that the difficulty is not insuperable. At relatively greater expense, it is still feasible to develop a medical school in such an environment: there is no magnet like reputation; nothing travels faster than the fame of a great healer; distance is an obstacle readily overcome by those who seek health. The poor as well as the rich find their way to shrines and healing springs. The faculty of medicine in these schools may even turn the defect of situation to good account; for, freed from distraction, the medical schools at Iowa City and Ann Arbor may the more readily cultivate clinical science. An alternative may indeed be tried in the shape of a remote department. The problem in that case is to make university control real, to impregnate the distant school with genuine university spirit. The difficulty of the task may well deter those whose resources are scanty or who are under no necessity of engaging in medical teaching. As we need many universities and but few medical schools, a long-distance connection is justified only where there is no local university qualified to assume responsibility. A third solution—division—may, if the position taken in previous chapters is sound, be disregarded in the final disposition.[2]

(3) We shall assign only one school to a single town. As a matter of fact, no American city now contains more than one well-supported university[3]—and if we find it unnecessary or impolitic to duplicate local university plants, it is still less necessary to duplicate medical schools. The needless expense, the inevitable shrinkage of the student body, the difficulty of recruiting more than one faculty, the disturbance due to competition for hospital services, argue against local duplication. It is sometimes contended that competition is stimulating: Tufts claims to have waked up Harvard; the second Little Rock school did undoubtedly move the first to spend several hundred dollars on desks and apparatus. But competition may also be demoralizing; the necessity of finding students constitutes medical schools which ought to elevate standards the main obstacles to their elevation: witness the attitude of several institutions in Boston, New York, Philadelphia, Baltimore and Chicago. Moreover, local competition is a stimulus far inferior to the general scientific competition to which all well equipped, well conducted and rightly inspired university departments throughout the civilized world are parties. The English have experimented with both forms—a single school in the large provincial towns, a dozen or more in London—and their experience inclines them to reduce as far as possible the number of the London schools. Amalgamation has already taken place in certain American towns: the several schools of Cincinnati, of Indianapolis and of Louisville have all recently "merged." This step is easy enough in towns where there is either no university or only one university. Where there are several, as in Chicago, Boston and New York, the problem is more difficult. Approached in a broad spirit it may, however, prove not insoluble; cooperation may be arranged where several institutions all

[2] We shall omit the half-school because it may be considered to divide with the whole school the work of the first two years; it does not greatly affect the clinical output, with which this chapter is mainly concerned.

[3] Chicago is almost an exception, as Northwestern University is situated at Evanston, a suburb.

possess substantial resources; universities of limited means can retire without loss of prestige—on the contrary, the respect in which they are held must be heightened by any action dictated by conscientious refusal to continue a work that they are in no position to do well.

(4) A reconstruction of medical education can not ignore the patent fact that students tend to study medicine in their own states, certainly in their own sections. In general, therefore, arrangements ought to be made, as far as conditions heretofore mentioned permit, to provide the requisite facilities within each of the characteristic state groups. There is the added advantage that local conditions are thus heeded and that the general profession is at a variety of points penetrated by educative influences. New Orleans, for example, would cultivate tropical medicine; Pittsburgh, the occupational diseases common in its environment. In respect to output, we may once more fairly take existing conditions into account. We are not called on to provide schools enough to keep up the present ratio. As we should in any case hardly be embarrassed for almost a generation in the matter of supply, we shall do well to produce no doctors who do not represent an improvement upon the present average.

The principles above stated have been entirely disregarded in America. Medical schools have been established regardless of need, regardless of the proximity of competent universities, regardless of favoring local conditions. An expression of surprise at finding an irrelevant and superfluous school usually elicits the reply that the town, being a "gateway" or a "center," must of course harbor a "medical college." It is not always easy to distinguish "gateway" and "center"; a center appears to be a town possessing, or within easy reach of, say 50,000 persons; a gateway is a town with at least two railway stations. The same place may be both—in which event the argument is presumably irrefragable. Augusta, Georgia, Charlotte, N. C., and Topeka, Kans., are "centers," and as such are logical abodes of medical instruction. Little Rock, St. Joseph, Memphis, Toledo, Buffalo, are "gateways." The argument, so dear to local pride, can best be refuted by being pursued to its logical conclusion. For there are still forty-eight towns in the United States with over 50,000 population each, and no medical schools: we are threatened with forty-eight new schools at once, if the contention is correct. The truth is that the fundamental, though of course not sole, consideration is the university, provided its resources are adequate; and we have fortunately enough strong universities, properly distributed, to satisfy every present need without serious sacrifice of sound principle. The German Empire contains eighty-four cities whose population exceeds 50,000 each. Of its twenty-two medical schools, only eleven are to be found in them: that is, it possesses seventy-three gateways and centers without universities or medical schools. The remaining eleven schools are located in towns of less than 50,000 inhabitants, a university town of 30,000 being a fitter abode for medical study than a non-university town of half a million, in the judgment of those who have best succeeded with it.

That the existing system came about without reference to what the country needed or what was best for it may be easily demonstrated. Between 1904 and 1909 the country gained certainly upwards of 5,000,000 in population; during the same period the number of medical students actually decreased from 28,142 to 22,145, *i. e.*, over 20 per cent. The average

annual production of doctors from 1900 to 1909 was 5,222; but last June the number dropped to 4,442. Finally, the total number of medical colleges which reached its maximum—166[4]—in 1904 has in the five years since decreased about 10 per cent. Our problem is to calculate how far tendencies already observable may be carried without harm.

We have calculated that the south requires for the next generation 490 new doctors annually, the rest of the country, 1,500. We must then provide machinery for the training of about 2,000 graduates in medicine yearly. Reckoning fatalities of all kinds at ten per cent. per annum, graduating classes of 2,000 imply approximately junior classes of 2,200, sophomore classes of 2,440, freshman classes aggregating 2,700—something over 9,000 students of medicine. Thirty medical schools, with an average enrollment of 300 and average graduation classes of less than 70, will be easily equal to the task. As many of these could double both enrollment and output without danger, a provision planned to meet present needs is equally sufficient for our growth for years to come. It will be time to devise more schools when the productive limit of those now suggested shall come in sight.

For the purpose here in mind, the country may be conceived as divided into several sections, within each of which, with due regard to what it now contains, medical schools enough to satisfy its needs must be provided. Pending the fuller development of the states west of the Mississippi, the section east will have to relieve them of part of their responsibility. The provisional nature of our suggestions is thus obvious; for as the west increases in population, as its universities grow in number and strength, the balance will right itself: additional schools will be created in the west and south rather than in the north and east. It would of course be unfortunate to over-emphasize the importance of state lines. We shall do well to take advantage of every unmistakably favorable opportunity so long as we keep within the public need; and to encourage the freest possible circulation of students throughout the entire country.

1. New England represents a fairly homogeneous region, comprising six states, the population of which is increasingly urban. Its population increased, 1908–9, somewhat less than 75,000, requiring, on the basis of one doctor to every increase of 1,500 in population, 50 new doctors. About 150 physicians died. Seventy-five men would replace one half of these. In all, 125 new doctors would be needed. To produce this number two schools, one of moderate size and one smaller, readily suffice. Fortunately they can be developed without sacrificing any of our criteria. The medical schools of Harvard and Yale are university departments, situated in the midst of ample clinical material, with considerable financial backing now and every prospect of more. It is unwise to divide the Boston field; it is unnecessary to prolong the life of the clinical departments of Dartmouth, Bowdoin and Vermont. They are not likely soon to possess the financial resources needed to develop adequate clinics in their present location; and the time has passed when even excellent didactic instruction can be regarded as compensating for defective opportunities in obstetrics, contagious diseases and general medicine. The historic position of the schools in question counts little as against changed ideals. Dartmouth and Vermont can, however, offer the work of the first two years with the clinical coloring made feasible by the proximity of a hospital, as is the case

[4] Not including osteopathic schools.

with the University of Missouri at Columbia; with that they ought to be content for the time being.

2. The middle Atlantic states comprise for our purpose New York, New Jersey, Pennsylvania, Delaware, Maryland and the District of Columbia. Their population grows at the rate of 300,000 annually, for whom 200 doctors can care; 230 more would fill one half the vacancies arising through death: a total of 430 needed. Available universities are situated in New York City, Syracuse, Philadelphia, Pittsburgh, Baltimore. The situation is in every respect ideal; the universities located at New York, Philadelphia and Baltimore are strong and prosperous; those of Syracuse and Pittsburgh, though less developed, give good promise. Without sacrifice of a single detail, these five university towns can not only support medical schools for the section, but also to no small extent relieve less favored spots. The schools of Albany, Buffalo, Brooklyn, Washington,[5] would, on this plan, disappear—certainly until academic institutions of proper caliber had been developed. Whether even in the event of their creation they should for some years endeavor to cultivate medicine is quite doubtful. Appreciation of what is involved in the undertaking might well give them pause. Meanwhile, within the university towns already named there would be much to do: better state laws are needed in order to exterminate the worst schools; merger or liquidation must bring together many of those that still survive. The section under consideration ought indeed to lead the union; but the independent schools of New York and Pennsylvania are powerful enough to prove a stubborn obstacle to any progressive movement, however clearly in the public interest.

3. Greater unevenness must be tolerated in the south;[6] proprietary schools or nominal university departments will doubtless survive longer there than in other parts of the country because of the financial weakness of both endowed and tax-supported institutions. All the more important, therefore, for universities to deal with the subject in a large spirit, avoiding overlapping and duplication. An institution may well be glad to be absolved from responsibilities that some other is better fitted to meet. Tulane and Vanderbilt, for example, are excellently situated in respect to medical education; the former has already a considerable endowment applicable to medicine. The state universities of Louisiana and Tennessee may therefore resign medicine to these endowed institutions, grateful for the opportunity to cultivate other fields. Every added superfluous school weakens the whole by wasting money and scattering the eligible student body. None of the southern state universities, indeed, is wisely placed: Texas has no alternative but a remote department, such as it now supports at Galveston; Georgia will one day develop a university medical school at Atlanta; Alabama, at Birmingham—the university being close by, at Tuscaloosa. The University of Virginia is repeating Ann Arbor at Charlottesville; whether it would do better to operate a remote department at Richmond or Norfolk, the future will determine. Six schools are thus provided:[7] they are sufficient to the needs of the section just now. The resources available even for their support are as yet painfully

[5] Except Howard University, which, patronized by the government, is admirably located for the medical education of the negro.

[6] The south includes eleven states, viz., Virginia, Kentucky, North Carolina, South Carolina, Florida, Georgia, Tennessee, Mississippi, Louisiana, Arkansas, Texas.

[7] A seventh, Meharry, at Nashville, must be included for the medical education of the negro.

inadequate: three of the six are still dependent upon fees for both plant and maintenance. It is doubtful whether the other universities of the south should generally offer even the instruction of the first two years. The scale upon which these two-year departments can be now organized by them is below the minimum of continuous efficiency; they can contribute nothing to science, and their quota of physicians can be better trained in one of the six schools suggested. Concentration in the interest of effectiveness, team work between all institutions working in the cause of southern development, economy as a means of improving the lot of the teacher—these measures, advisable everywhere, are especially urgent in the south.

4. In the north central tier—Ohio, Indiana, Michigan, Wisconsin, Illinois—population increased 239,685 the last year: 160 doctors would care for the increase; 190 more would replace one half of those that died: a total of 350. Large cities with resident universities available for medical education are Cincinnati, Columbus, Cleveland and Chicago. Ann Arbor has demonstrated the ability successfully to combat the disadvantages of a small town. The University of Wisconsin can unquestionably do the same, with a slighter handicap, at Madison whenever it chooses to complete its work there. Indiana University has undertaken the problem of a distant connection at Indianapolis. Four cities thus fulfil all our criteria, two more develop the small town type, one more is an experiment with the remote university department. Surely the territory in question can be supplied by these seven medical centers. Chicago alone is likely to draw a considerable number of students from a wider area. It has long been a populous medical center. Nevertheless the number of high-grade students it just now contains is not large. If the practise of medicine in this area rested on a two-year college basis, as it well might, there would to-day be perhaps 600 students of medicine in that city. Cooperative effort between the two universities there and the state university at Urbana would readily provide for them.

5. The middle west comprises eight states, Minnesota, Iowa, Missouri, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, with a gain in population last year of 216,036, requiring 140 more physicians, plus 160 to replace half the deaths: a total of 300. To supply them, urban universities capable of conducting medical departments of proper type are situated in Minneapolis and St. Louis; and both deserve strong, well supported schools. For Minneapolis must largely carry the weight of the Dakotas and Montana; St. Louis must assist Texas and have an eye to Arkansas, Oklahoma and the southwest. The University of Nebraska, now dispersing its energies through a divided school, can be added to this list; for it will quite certainly either concentrate the department on its own site (Lincoln, population 48,232), or bring the two pieces together at Omaha, only an hour's distance away. The University of Kansas will doubtless combine its divided department at Kansas City. The State University of Iowa emulates Ann Arbor at Iowa City. These five schools must produce 297 doctors annually. Their capacity would go much farther. Oklahoma[8] and the Dakotas might well for a time postpone the entire question, supporting the work of the first two years, which they have already undertaken, on a much more liberal basis than they have yet reached. With the exception of St. Louis,

[8] Should it be possible for the State University of Oklahoma, by engaging in clinical work at Oklahoma City, to get and to retain a monopoly of the field, the step would doubtless be advisable even now.

all these proposed schools belong to state universities, and even at St. Louis the cooperation of the state university may prove feasible. A close relation may thus be secured between agencies concerned with public health and those devoted to medical education. The public health laboratory may become virtually part of the medical school—a highly stimulating relation for both parties. The school will profit by contact with concrete problems; the public health laboratory will inevitably push beyond routine, prosecuting in a scientific spirit the practical tasks referred to it from all portions of the state. The direct connection of the state with a medical school that it wholly or even partly maintains will also solve the vexed question of standards: for the educational standard which the state fixes for its own sons will be made the practise standard as well. Private corporations, whether within or without its borders, will no longer be permitted to deluge the community with an inferior product.

6. Seven thinly settled and on the whole slowly growing states and territories form the farther west: New Mexico, Colorado, Wyoming, Montana, Idaho, Utah, Arizona. Their increase in population was last year about 45,000. They contain now one doctor for every 563 persons. In view of local conditions, let us reckon one additional doctor for every additional 750 persons: 60 will be required. And, further, let us make up the death-roll man for man: 60 more would be needed—altogether 120. There are at the moment in this region only two available sites, Salt Lake City and Denver. At the former the University of Utah is situated; the latter could be occupied by the University of Colorado, located at Boulder, practically a suburb. The outlying portions of this vast territory will long continue to procure their doctors by immigration or by sending their sons to Minneapolis, Madison, Ann Arbor, Chicago or St. Louis.

The three states on the Pacific coast, California, Oregon, Washington, are somewhat self-contained. They increased last year by 53,454 persons, requiring 36 more physicians; 50 more would repair one half the losses by death: a total of 86. Available sites, filling the essential requirements, are Berkeley and Seattle. The former, with the adjoining towns of Alameda and Oakland, controls a population of 250,000 or more; the medical department of the University of California concentrated there would enjoy ideal conditions. At present the clinical ends of two divided schools share San Francisco, and the outlook for medical education of high quality is rendered dubious by the division. With unique wisdom the University of Washington and the physicians of Seattle have thus far refrained from starting a medical school in that state. They have held, and rightly, that in the present highly overcrowded condition of the profession on the coast, there is no need for an additional ordinary school; and the resources of the university are not yet adequate to a really creditable establishment. The field will therefore be kept clear until the university is in position to occupy it to advantage.

8. In Canada the existing ratio of physicians to population is 1:1030. The estimated increase in population last year was 239,516, requiring 160 new physicians; losses by death are estimated at 90. As the country is thinly settled and doctors much less abundant than in the United States, let us suppose these replaced man for man: 250 more doctors would be annually required. The task of supplying them could be for the moment safely left to the universities of Toronto and Manitoba, to McGill and to Laval at Quebec. Halifax,

Western (London) and Laval at Montreal have no present function. At some future time doubtless Dalhousie University at Halifax will need to create a medical department. The future of Queen's depends on its ability to develop halfway between Toronto and Montreal, despite comparative inaccessibility, the Ann Arbor type of school. As for the rest, the great northwestern territory will, as it develops, create whatever additional facilities it may require.

In so far as the United States is concerned, the foregoing sketch calls for 31 medical schools with a present annual output of about 2,000 physicians, *i. e.*, an average graduating class of about 70 each. They are capable of producing 3,500. All are university departments, busy in advancing knowledge as well as in training doctors. Nineteen are situated in large cities with the universities of which they are organic parts; four are in small towns with their universities; eight are located in large towns always close by the parent institutions. Divided and far distant departments are altogether avoided.

Twenty states[9] are left without a complete school. Most of these are unlikely to be favorably circumstanced for the next half century, so far as we can now judge. Several may, however, find the undertaking feasible within a decade or two. The University of Arkansas might be moved from Fayetteville to Little Rock; Oklahoma, if its rapid growth is maintained, may from Norman govern a medical school at Oklahoma City; Oregon may take full responsibility for Portland. Unfortunately, of the three additional schools thus created, only one, that at Little Rock, would represent conditions at their best. There is therefore no reason to hasten the others; for their problem may, if left open, be more advantageously solved.

To bring about the proposed reconstruction, some 120 schools have been apparently wiped off the map. As a matter of fact, our procedure is far less radical than would thus appear. Of the 120 schools that disappear, 37 are already negligible, for they contain less than 50 students apiece; 13 more contain between 50 and 75 students each, and 16 more between 75 and 100. That is, of the 120 schools, 66 are so small that their student bodies can, in so far as they are worthy, be swept into strong institutions without seriously stretching their present enrolment. Of the 30 institutions that remain, several will survive through merger. For example, the Cleveland College of Physicians and Surgeons could be consolidated with Western Reserve; the amalgamation of Jefferson Medical College and the University of Pennsylvania would make one fair-sized school on an enforced two-year college standard; Tufts and Harvard, Vanderbilt and the University of Tennessee, Creighton and the Uni ity of Nebraska, would, if joined, form stitutions of moderate size, capable of c siderable expansion before reaching the limit of efficiency.

In order that these mergers may be effective, not only institutional, but personal ambition must be sacrificed. It is an advantage when two schools come together; but the advantage is gravely qualified if the new faculty is the arithmetical sum of both former faculties. The mergers at Cincinnati, Indianapolis, Louisville, Nashville, have been arranged in this way. The fundamental principles of faculty organization are thus sacrificed. Unless combina-

[9] They are Maine, New Hampshire, Vermont, West Virginia, North Carolina, South Carolina, Florida, Mississippi, Kentucky, Arkansas, Oklahoma, North Dakota, South Dakota, Montana, Wyoming, Idaho, New Mexico, Arizona, Nevada, Oregon. One school will not long content the state of Texas.

tion is to destroy organization, titles must be shaved when schools unite. There must be one professor of medicine, one professor of surgery, etc., to whom others are properly subordinated. What with superabundant professorial appointments, due now to desire to annex another hospital, and again to annexation of another school, faculties have become unmanageably large, viewed either as teaching, research, or administrative bodies.

Reduction of our 155 medical schools to 31 would deprive of a medical school no section that is now capable of maintaining one. It would threaten no scarcity of physicians until the country's development actually required more than 3,500 physicians annually, that is to say, for a generation or two, at least. Meanwhile, the outline proposed involves no artificial standardization: it concedes a different standard to the south as long as local needs require; it concedes the small town university type where it is clearly of advantage to adhere to it; it varies the general ratio in thinly settled regions; and, finally, it provides a system capable without overstraining of producing twice as many doctors as we suppose the country now to need. In other words, we may be wholly mistaken in our figures without in the least impairing the feasibility of the kind of renovation that has been outlined; and every institution arranged for can be expected to make some useful contribution to knowledge and progress.

The right of the state to deal with the entire subject in its own interest can assuredly not be gainsaid. The physician is a social instrument. If there were no disease, there would be no doctors. And as disease has consequences that immediately go beyond the individual specifically affected, society is bound to protect itself against unnecessary spread of loss or danger. It matters not that the making of doctors has been to some extent left to private institutions. The state already makes certain regulations; it can by the same right make others. Practically the medical school is a public service corporation. It is chartered by the state; it utilizes public hospitals on the ground of the social nature of its service. The medical school can not then escape social criticism and regulation. It was left to itself while society knew no better. But civilization consists in the legal registration of gains won by science and experience; and science and experience have together established the terms upon which medicine can be most useful. "In the old days," says Metchnikoff,[10] "anyone was allowed to practise medicine, because there was no medical science and nothing was exact. Even at the present time among less civilized people, any old woman is allowed to be a midwife. Among more civilized races, differentiation has taken place and childbirths are attended by women of special training who are midwives by diploma. In case of nations stilll more civilized, the trained midwives are directed by obstetric physicians who have specialized in the conducting of labor. This high degree of differentiation has arisen with and has itself aided the progress of obstetrical science." Legislation which should procure for all the advantage of such conditions as is now possible would speedily bring about a reconstruction quite as extensive as that described.

Such control in the social interest inevitably encounters the objection that individualism is thereby impaired. So it is, at that level; so it is intended. The community through such regulation undertakes to abridge the freedom of particular individuals to exploit certain conditions for their

[10] "The Nature of Man" (translated by Chalmers), p. 300.

personal benefit. But its aim is thereby to secure for all others more freedom at a higher level. Society forbids a company of physicians to pour out upon the community a horde of ill-trained physicians. Their liberty is indeed clipped. As a result, however, more competent doctors being trained under the auspices of the state itself, the public health is improved; the physical well-being of the wage-worker is heightened; and a restriction put upon the liberty, so-called, of a dozen doctors increases the effectual liberty of all other citizens. Has democracy, then, really suffered a set-back? Reorganization along rational lines involves the strengthening, not the weakening, of democratic principle, because it tends to provide the conditions upon which well-being and effectual liberty depend.

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*HENRY AUGUSTUS TORREY*[1]

Henry Augustus Torrey, assistant professor of chemistry and member of this faculty for the last seven years, died of endocarditis on Friday, March 25, at his home, 5 Fuller Place, Cambridge, after an illness of several weeks.

Torrey was born on August 29, 1871, at Burlington, Vt., the son of Professor Henry A. P. Torrey, of the philosophical department of the University of Vermont, and Sarah Paine Torrey, daughter of the late President Torrey of the same university. Thus he came on both sides from families noted in the educational world. He received the degree of bachelor of arts from the University of Vermont in 1893, and in the following year took a position as assistant in food investigations at Middletown, Conn., going thence to Harvard in 1895. From Harvard he received the degree of master of arts in 1896 and doctor of philosophy in 1897, as well as a Parker fellowship in the following year, which he devoted to study in Leipzig and Berlin. On his return from Europe in 1898 he became instructor in the University of Vermont, where he was made assistant professor in 1899. In 1903 he was called to an instructorship at Harvard, and was promoted in 1905 to the assistant professorship which he held at the time of his death. In 1906 he was married to Miss Dorothy Van Patten, of Davenport, Ia., who with one son survives him.

Torrey was selected as instructor in organic chemistry after careful deliberation and much thought, because he was believed to combine in rare degree all the varied attributes needed by the successful teacher and investigator; and his work immediately vindicated the choice. In his lectures he succeeded in so illuminating an involved and technical subject as to show clearly the vivid interest of its underlying facts and theories; and through his numerous papers on structural organic chemistry he had already begun to make his mark among those who seek to discover not merely the products but also the mechanism of organic changes. His knowledge of physical chemistry contributed greatly to his power of solving the new problems which daily confront the organic chemist. His academic advancement was assured, he loved the university, and rejoiced in his opportunity to serve her. His place is very hard to fill.

His kindly and sympathetic personality won for him many friends among both the faculty and the students. All who knew him prized very highly his ideals and his faithfulness in ever seeking to attain them. Among the students he was unusually popular, not because his courses were easy (they were indeed unusually difficult), but because the men appreciated his intelligence and his uprightness as well as his vivifying similes and his quaint sense of humor. Few even among his intimates realized fully the heroism with which he threw himself into his work. His health was frail, and he well knew its frailty; but he never faltered. His courage was none the less real because it was silent and unobtrusive. He leaves with us poignant regret for his untimely death, an enduring reverence for the

[1] Read at the meeting of the faculty of arts and sciences of Harvard University, and entered upon its records, June 21, 1910.